

REMARKS

The Office Action dated June 29, 2005, has been received and reviewed.

Claims 17-33, 50-72, 74-105 are currently pending and under consideration in the above-referenced application, each standing rejected.

Reconsideration of the above-referenced application is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

Claims 17-33, 50-72, 74-105 stand rejected under 35 U.S.C. § 103(a).

The standard for establishing and maintaining a rejection under 35 U.S.C. § 103(a) is set forth in M.P.E.P. § 706.02(j), which provides:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Fischer in View of Chen

Claims 17, 19-24, 26-33, 102, and 103 have been rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over the subject matter taught in U.S. Patent 5,185,291 to Fischer et al. (hereinafter "Fischer"), in view of teachings from U.S. Patent 5,712,206 to Chen (hereinafter "Chen").

Fischer teaches a fuse for use in a semiconductor device structure, as well as a process for fabricating the fuse. The fuse of Fischer, which is disposed over an insulative structure (*i.e.*, dielectric 10) (*see, e.g.*, FIGs. 1-4; col. 2, lines 29-36), includes a first conductive layer 11 and a second conductive layer 12. The first conductive layer 11 of the finished fuse may be formed from aluminum or tungsten (col. 2, lines 43-45) and includes two spaced apart end regions (FIG. 3). The second conductive layer 12 of the fuse may be formed from the same

material as the first layer 11 or from polysilicon. Col. 2, lines 59-63. In a finished fuse, such as that illustrated in FIG. 3 of Fischer, end portions of the second conductive layer 12 overlie the spaced apart regions of the first conductive layer 11, while the central portion 111 of the second conductive layer 12 is located in substantially the same plane as the first conductive layer 11 and between the spaced apart portions of the first conductive layer 11. *See also*, col. 2, lines 56-58.

Fischer teaches that the fuse may be fabricated by forming a first layer of conductive material 11 over an insulative structure 10 (FIG. 1; col. 2, lines 45-48), patterning a "window" 111 in the first layer of conductive material to expose a portion of the underlying insulative structure (FIG. 1; col. 2, lines 36-38; col. 3, lines 34-55), forming a second layer 12 of conductive material over the first layer 11 and within the window 111 (FIG. 2; col. 2, lines 49-55), and patterning the "combined" first and second layers to form the fuse (FIG. 3; col. 2, lines 56-58).

Chen likewise teaches a fuse and a method for fabricating the fuse. The fuse of Chen may be formed from aluminum, titanium tungsten, a silicide or polycide, or polysilicon. Col. 5, lines 59-63, but only includes a single material layer.

A portion of the fuse described in Chen is exposed by way of a so-called fuse "window." *See, e.g.*, col. 4, lines 50-54. This "window" facilitates programming of the fuse with a laser. *See* col. 7, lines 38-40. In order to prevent contamination of the fuse prior to programming thereof, as well as to prevent contamination of the underlying semiconductor device features following programming of the fuse, Chen teaches a method for forming a moisture barrier both above and beneath the window of the fuse.

A prima facie case of obviousness has not been established with respect to the subject matter recited in claims 17, 19-24, and 26-33. In particular, one of ordinary skill in the art would not have been motivated to combine the teachings of Fischer and Chen in the manner that has been asserted in the outstanding Office Action.

Specifically, Fisher does not provide any motivation to one of ordinary skill in the art to form one of the fuse layers taught therein from a metal silicide. Chen does not provide one of ordinary skill in the art with any motivation to use a multi-layer fuse in place of the single-layer fuse taught therein. As neither of these references nor the knowledge that was generally available

in the art prior to the filing date of the above-referenced application provides any suggestion of the desirability of forming a fuse with multiple layers, one of which comprises a metal silicide, another of which comprises metal or polysilicon, none of Fischer, Chen, or the knowledge that was generally available in the art before the filing date of the above-referenced application would have motivated one of ordinary skill in the art to make the asserted combination.

Moreover, by touting the usefulness of aluminum, tungsten, or polysilicon for use in forming the programmable portion of the fuse described therein, Fischer teaches away from the asserted motivation to use a metal silicide as a programmable portion of a fuse.

Further, Fischer teaches methods for fabricating a fuse which is configured to be blown by an electrical current, while the teachings of Chen are limited to a method for fabricating a fuse which is configured to be blown with a laser beam.

As such motivation to combine reference teachings is obviously lacking, the rejection of claims 17, 19-24, and 26-33 appears to be based entirely and improperly upon hindsight gleaned from the teachings of the above-referenced application.

Therefore, a *prima facie* case of obviousness of claims 17, 19-24, and 26-33 has not been established pursuant to the requirements of 35 U.S.C. § 103(a). Accordingly, claims 17, 19-24, 26-33, 102, and 103 are allowable over the teachings of Fischer and Chen.

Fischer, Chen, and Mitani

Claim 18 is rejected under 35 U.S.C. § 103(a) for being drawn to subject matter that is purportedly unpatentable over teachings from Fischer, in view of the teachings of Chen and, further, in view of the subject matter taught in Japanese Patent Publication 59-154038 of Mitani (hereinafter “Mitani”).

Mitani teaches a fuse with lower layer that is formed from polycrystalline silicon and an upper layer with spaced apart regions that are formed from a metal silicide, as well as methods for fabricating such a fuse. Mitani, Abstract. In the fabrication method, the polycrystalline silicon is first deposited on a field oxide. *Id.* Next, a layer of metal silicide is formed over the polycrystalline silicon, and the layers are etched in combination. *Id.* Finally, the intermediate

part of the metal silicide is etched, leaving only polycrystalline silicon as the central region of the finished fuse, the portion of the fuse that is to be ruptured. *Id.*

Claim 18 is allowable, among other reasons, as depending from claim 17, which should be allowed.

Moreover, Mitani does not remedy the deficiencies that have been noted previously herein with respect to the asserted combination of Fischer and Chen. Specifically, one of ordinary skill in the art would not have been motivated to combine the teachings of Mitani with those of Fischer or Chen in the manner that has been asserted in the outstanding office action.

The teachings of Fischer are limited to methods for fabricating a multi-layer fuse, the upper layer of which is configured to be “blown” to program the fuse. None of the layers of that fuse comprises metal silicide. Nor does Fischer provide one of ordinary skill in the art with any motivation to use metal silicide to form one of the layers of the fuse described therein. Chen teaches a method for forming a single-layer fuse from a variety of materials, including metal silicide, but does not provide one of ordinary skill in the art with any motivation to also use another conductive material and, thus, multiple layers at the ends, or terminals, of the fuse. While Mitani includes the combined use of a metal silicide layer with a polysilicon layer, Mitani teaches that the upper metal silicide layer, not the lower polysilicon layer, is patterned to form discrete, spaced apart regions and that the lower polysilicon layer, not the upper metal silicide layer, is useful for forming the region of the fuse which is to be ruptured.

One of ordinary skill in the art would not have been motivated to combine teachings from Fischer, Chen, and Mitani in the asserted manner because none of these references would have provided one of ordinary skill in the art with any clear guidance as to the function of metal silicide in a multi-layered fuse (*i.e.*, as a terminal or a programmable element) or on which law for the multi-layered fuse should serve as the programmable element thereof.

For these reasons, one of ordinary skill in the art would not be motivated, either by the teachings of Fischer, Chen, and Mitani, or by the knowledge that was available to one of ordinary skill in the art prior to the filing date of the above-referenced application, to combine the teachings of Fischer, Chen, and Mitani in the manner that has been asserted.

Any such motivation could only have been improperly gleaned from the hindsight which the description of the above-referenced application provides.

There Is No Reasonable Expectation that the Proposed Combination Would Be Successful

One of ordinary skill in the art would not have any reason to expect that combining the methods described in Fischer, Chen, and Mitani would result in the method that is recited in claim 18. This is primarily due to directive provided in M.P.E.P. § 2141.02 that, in combining reference teachings, the teachings of the references must be considered in their entireties. Due to the extreme divergence between the methods of Fischer, Chen, and Mitani, there is no way all of the teachings of these references could be considered in developing a fuse fabrication method such as to which claim 18 is limited. The most likely result of such a combination would resemble the method taught in Mitani, without removal of material of the metal silicide layer from the region of the fuse which is configured to rupture during patterning of the metal silicide layer.

Furthermore, as none of Fischer, Chen, or Mitani teaches or suggests forming laterally discrete, spaced apart regions from a layer of conductive material between and around which an underlying insulative structure is exposed, as recited in claim 17, from which claim 18 depends, there is no way that one of ordinary skill in the art would have a reasonable expectation that the asserted combination of teachings from Fischer, Chen, and Mitani could result in the method which is recited in claim 18.

As a *prima facie* case of obviousness has not been set forth, claim 18 is allowable over the combination of Fischer, Chen, and Mitani.

Fischer, Chen, and Sandhu

Claim 25 stands rejected under 35 U.S.C. § 103(a) for being directed to subject matter that is allegedly unpatentable over the teachings of Fischer, in view of the subject matter taught in Chen and, further, in view of teachings from U.S. Patent 5,231,056 to Sandhu (hereinafter "Sandhu").

Sandhu teaches a process for depositing a tungsten silicide film on a substrate using chemical vapor deposition.

Claim 25 is allowable, among other reasons, as depending from claim 17, which should be allowed. Claim 25 is further allowable since Sandhu, which merely teaches a process for depositing a tungsten silicide film by chemical vapor deposition, does not provide any teaching or suggestion which remedies the aforementioned deficiencies in the asserted combination of Fischer and Chen.

Fischer, Mitani, and Chen

Claims 50, 51, 55-60, and 62-68 have been rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over the subject matter taught in Fischer, in view of teachings from Mitani and, further, in view of teachings from Chen.

The reasons that one of ordinary skill in the art would not have been motivated to combine the teachings of these references in the asserted manner and the reasons that one of ordinary skill in the art would have not reason to expect the asserted combination to be successful have been set forth above.

Therefore, the asserted combination of Fischer, Mitani, and Chen cannot support a *prima facie* case of obviousness, pursuant to 35 U.S.C. § 103(a), against independent claim 50. Therefore, under 35 U.S.C. § 103(a), independent claim 50, as well as each of claims 51, 55-60, and 62-68, which depend either directly or indirectly from claim 50, is allowable over the subject matter taught in Fischer, Mitani, and Chen.

Fischer, Mitani and Chen in view of Degelormo

Claims 52-54, 69, and 70 stand rejected under 35 U.S.C. § 103(a) for reciting subject matter that is allegedly unpatentable over the subject matter taught in Fischer, in view of teachings from Mitani, Chen, and U.S. Patent 5,242,859 to Degelormo et al. (hereinafter “Degelormo”).

The teachings of Fischer, Mitani, and Chen have been summarized previously herein.

Degelormo merely teaches a chemical vapor deposition method for forming layers of conductively doped polysilicon. Degelormo includes no teaching or suggestion that the CVD process thereof may be used to fabricate any part of a fuse or structures associated directly with a fuse.

As Degelormo merely teaches a chemical vapor deposition method for forming layers of conductively doped polysilicon without teaching or suggesting that the CVD process thereof may be used to fabricate any part of a fuse or structures associated directly with a fuse, Degelormo includes no teaching or suggestion that would remedy the deficiencies of Fischer, Mitani, and Chen with respect to their inabilities to have provided one of ordinary skill in the art with motivation to make the asserted combination of reference teachings.

Nor do the teachings of Degelormo provide one of ordinary skill in the art with any additional reason to believe that the teachings of Fischer, Mitani, Chen, and Degelormo could be successfully combined to provide a method for fabricating a fuse.

Furthermore, claims 52-54, 69, and 70 are each allowable, among other reasons, as depending from claim 50, which is allowable.

Therefore, under 35 U.S.C. § 103(a), claims 52-54, 69, and 70 are allowable over the teachings of Fischer, Mitani, Chen, and Degelormo. As such, it is respectfully requested that the 35 U.S.C. § 103(a) rejection of claims 52-54, 69, and 70 be withdrawn.

Fischer, Mitani, Chen, and Sandhu

Claim 61 stands rejected under 35 U.S.C. § 103(a) for being drawn to subject matter which is assertedly unpatentable over that taught in Fischer, Mitani, Chen, and Sandhu.

As explained previously herein, Sandhu does not provide any teaching or suggestion that remedies the deficiencies that have been identified herein with respect to the asserted combination of Fischer and Chen. For the same reasons, as well as those discussed previously herein with respect to the asserted combination of Fischer, Mitani, and Chen, Sandhu would not remedy the deficiencies that have been noted regarding the asserted combination of Fischer, Mitani, and Chen. Therefore, a *prima facie* case of obviousness cannot be established against

claim 61 based merely upon the asserted combination of teachings from Fischer, Mitani, Chen, and Sandhu.

Claim 61 is allowable, among other reasons, as depending from claim 50 and 60, which are allowable.

Mitani, Fischer, and Chen

Claims 71, 74-86, 88-96, 101, 104, and 105 are rejected under 35 U.S.C. § 103(a) for reciting subject matter which is purportedly unpatentable over the teachings of Mitani, in view of teachings from Fischer and Chen.

Independent claim 71 recites a method of fabricating a gate and a fuse that includes patterning regions of a layer of polysilicon to form laterally discrete, spaced apart regions of polysilicon around and between which an underlying field oxide region is exposed.

For the same reasons provided previously herein, one of ordinary skill in the art would not have been motivated to combine the teachings of Mitani, Fischer, and Chen. Moreover, for reasons presented previously herein, one of ordinary skill in the art would have no reason to believe that combining the teachings of these references would result in the method recited in claims 71, 74-86, 88-96, and 101 of the above-referenced application.

Therefore, a *prima facie* case of obviousness cannot be established based on the teachings of Mitani, Chen, and Fischer. Therefore, the 35 U.S.C. § 103(a) rejection of claims 71, 74-86, 88-96, 101, 103, and 104 should be withdrawn.

Mitani, Fischer and Chen in view of Degelormo

Claim 72 stands rejected under 35 U.S.C. § 103(a) for reciting subject matter which is assertedly unpatentable over that taught in Mitani, Fischer, Chen, and Degelormo.

Claim 72 is allowable, among other reasons, as depending from claim 71, which should be allowed.

Mitani, Fischer and Chen in view of Sandhu

Claim 87 is rejected under 35 U.S.C. § 103(a) for being directed to subject matter that is purportedly unpatentable over the subject matter taught in Mitani, Fischer, Chen, and Sandhu.

Claim 87 is allowable, among other reasons, as depending from claim 71, which should be allowed.

Mitani, Fischer and Chen in view of Ukeda

Claim 97-100 have been rejected under 35 U.S.C. § 103(a) for being drawn to subject matter which is allegedly unpatentable over teachings from Mitani, Fischer, Chen, and U.S. Patent 6,069,055 to Ukeda et al. (hereinafter “Ukeda”).

Ukeda teaches a dry etch process for anisotropically removing exposed regions of a polysilicon layer through a metal silicide layer. Ukeda does not teach or suggest that the process disclosed therein may be used in fabricating a fuse.

Accordingly, it is clear that Ukeda does not remedy the deficiencies of Mitani, Chen, and Fischer, and the knowledge that was generally available in the art prior to the filing date of the above-referenced application with respect to providing some motivation to one of ordinary skill in the art to combine the teachings of these references. It is also clear that Ukeda does not include any teaching that would give one of ordinary skill in the art a reasonable basis for expecting the combination of Mitani, Chen, Fischer, and Ukeda to provide a successful method for fabricating a fuse.

Claims 97-100 are each allowable, among other reasons, as depending from claim 71, which should be allowed.

Withdrawal of the 35 U.S.C. § 103(a) rejections of claims 17-33, 50-72, 74-105 is respectfully requested.

CONCLUSION

It is respectfully submitted that each of claims 17-33, 50-72, 74-105 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Brick G. Power", with a long horizontal flourish extending to the right.

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